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The map sheds much light on the various routes, pilgrim and otherwise, across Arabia, gives a new and definite theory as to the great Tuwaiq Range and the Wadi Dawasir system, assigns a new position to the much-disputed Jabrin oasis, and leaves little to be conjectured as to the whole Persian Gulf littoral and much of its hinterland. The topography of the Oman peninsula has been more definitely depicted, conflicting authorities as to the geography of the Hadhramaut have been reconciled, and much new data on that region utilized. Of the southwest corner of Arabia, from the large geographical point of view, it leaves nothing now to be ascertained. At the same time, all former and new information as to Yaman has been added to the work of Herr Glaser. The Hijaz Railway is shown completely.

These are a few of the many points entered into by this new map. But the chief lesson it brings home to geographers is that, by the very largeness of its scale as compared with other maps, it shows what an immense stretch of the unknown still lies in Arabia.

The system of transliteration is that recently adopted by the Government of India.

It is understood that an effort is to be made to include in this map, before final publication, the routes of Captains Butler and Aylmer and of Mr. Douglas Carruthers. The data from these two expeditions were not available when this map was completed.

GEOGRAPHICAL RECORD

NORTH AMERICA

CARL LUMHOLTZ'S EXPLORATIONS. The Society has received a letter from Mr. Lumholtz, written at Sonoyta, in the Northwest part of Sonora, Mexico, on April 4. He left New York in May, last year, to make ethnological and physico-geographical investigations in the arid northwestern part of Sonora (*Bull.* 1909, p. 383). He writes that he has been at work there for many months and has also included in his field the adjacent southwestern part of Arizona. Sonoyta is an oasis in the arid region and he had just returned there from a three months' journey in the desert proper, travelling west to the Colorado river, south to the Gulf of California and north to the southern Sierras of Arizona. The region is very little known. Drs. Hornaday and Macdougall, in their journey, about two years ago, went only a short distance to the west and south of the Pinacate Mountains.

Mr. Lumholtz travelled entirely around the Pinacate region which extends about 50 miles, north and south. He also spent several days at Sierra Blanca,

south of it, a hitherto unexplored mountain range. In the arboreal desert west of Pinacate, there are comparatively few Sierras or Cerros but he visited several that were unexplored and nameless. One mountain, which he named El Capitán, southwest of Sierra de la Tinaja Alta, will be a landmark for travellers who must pass it to reach Laguna Prieta, an interesting lake on the border of great sand dunes. Its waters are salt but potable water is found by digging among the bullrushes on its marshy shore. When he reached the lake his animals had been 76 hours without water.

From the Colorado river he travelled south along the coast, using water, more or less brackish, for 20 days. A spade is needed in the outfit to dig for water at some places known to the Indians and a few Mexicans. At one place drinkable water was found on the beach, covered at high tide but oozing between some rocks at low tide. Grass for the animals was not abundant, but there are several kinds, the most important being the *galleta*. A number of bushes, especially the *chamiso*, supply good fodder; but the leaves of the ironwood tree are best relished by horses, mules and donkeys. As a rule, his animals had water only once in 36 hours. Sometimes they were 72 hours without it. The mules and donkeys stood this well when the weather was not very warm, but most of the horses died in the sand dunes though born in these western regions. Donkeys are best adapted for this kind of exploration, and mules next.

While at a water hole in the Pinacate region, Mr. Lumholtz, with two Indians, made a 13-days' trip to explore a Sierra which is visible both from Pinacate and the Colorado river. They found only two water places, so-called tinajas (natural tanks), where rain water collects. They travelled 175 miles and returned to camp with their burros (donkeys) in good condition. One of them carried two barrels of water, about 200 pounds. Mr. Lumholtz continues:

"The tinajas are drying up for there has been no rain this winter, excepting a little in January, in the extreme western part of the desert. Still the vegetation, such as it is, seems to thrive. The curious, straggling *ocotillos* show their splendid red flowers that look so well against the gray and somber background of the Sierras. In the sand beds of the arroyas, dry since last September, grow *chuparosa* higher than a man, covered with hundreds of flowers. The brittle bush near it is covered with yellow flowers and both suggest tropical luxuriance. These plants must have their roots very deep in the sand.

"The desert is usually silent, to be sure, but has its animal life. Quails are found up to 20 miles from water; also the mocking bird and several other songsters. Hawks and buzzards are found everywhere. Lizzards, mice and rats abound. The mountain sheep is numerous among all the Sierras from the Colorado and Gila rivers almost as far as Hermosillo, the Capital of Sonora. Jack rabbits and cotton tails are seen but are not numerous. These animals, apparently do not need much water. The Indians say that the animals of the desert never drink, unless it rains. The antelope is fond of eating the spring *cholla*, which contains a great deal of water; hence its abstinence from water may be understood. Mexican cattle are known to subsist for weeks and months on the green and juicy herbs of the sand dunes, after the winter rains, as well as on the *cholla*, without needing to drink water, and they grow fat by it. This, I might verify by many interesting facts.

"The country explored by me is a great arboreal desert, with numerous Sierras, much worn down. They run almost invariably from southeast to north-

west and, oddly enough, this is generally also the direction of the veins of ore here. The formation is granite and volcanic.

"Across this arboreal desert, in its southern part, runs a belt of sand dunes, from Puerto de Lobos, in the neighborhood of Caborca, almost to the Colorado river. It is generally close to the sea, but gradually retires somewhat from the coast. At Laguna Prieta, it is nearly 20 miles away. This belt of sand dunes is interrupted for some miles at Sierra Pinto. The largest sand dunes are found in the western part of the belt. I measured one by my aneroid and found it to be 185 feet high; others may be slightly higher. The sand dunes are of a somewhat reddish hue and there is nothing depressing about them.

"I shall have a later opportunity to describe their peculiar animal and plant life. As for those interesting natives of the desert, the Papago Indians, I shall also have to defer to the near future, any mention of them."

IMPOVERISHING THE SOIL. The great grain regions of Central Canada are producing larger crops of wheat every year, but this is because the acreage sown to wheat is rapidly increasing and not for the reason that anything is yet being done to maintain the fertility of the soil. The statistics in "Canada West," one of the recent publications of the Department of the Interior, Canada, show that the average yield, per acre, in Manitoba was 26 bushels in 1902, 14.22 bushels in 1907, and 17.28 in 1908; Saskatchewan, 25.41 bushels in 1901, 14.9 in 1907 and 13.60 in 1908; Alberta, 24.58 bushels in 1901, 22.13 in 1907 and 22.60 in 1908. In fact, the pioneer farmers of that great, new source of wheat supply are following the same system of incessant cropping of the land that has reduced the average production in our own great wheat states to 13.5 bushels per acre while in England it is 30 bushels, in Belgium, 34.5 bushels and in Germany, 27 bushels. The needs of the world, of course, will ultimately require that these exceptionally fine wheat lands be won back to their early fertility by scientific tillage.

SURVEY OF THE NORTHERN AND NORTHWESTERN LAKES. The U. S. Lakes Survey Office, Detroit, Mich., has issued *Bulletin* 19, giving a description of the Great Lakes, their harbors, channels, and navigable tributaries, with a large amount of detail of special use to mariners. This publication is issued annually, No. 19 being current during the present year, while supplements are issued monthly during the navigable season to supply all items of change affecting the published matter of the Bulletins. Thus the Bulletins and Supplements together supply the detailed descriptions and the particulars of constantly changing conditions that cannot be shown on the charts. These publications are supplied free of charge to navigators and other chart purchasers.

SOUTH AMERICA

IRON RESOURCES OF BRAZIL. The Geological Survey of Brazil has prepared a report on the available iron-ore supply of the country for the International Geological Congress which meets at Stockholm this year. Attention is called to the enormous wealth of the State in this respect. It is stated that when the full text of the report is published it will startle the iron world and be the sensation of the congress. On the basis of the examination of fifty-two localities in Minas Geraes it is reported that the ore is from 60 to 75 per cent. pure iron and free from all impurities that would interfere with its proper smelting. The total amount of easily accessible high-grade ore in the state of Minas Geraes alone is

conservatively estimated at 12,000,000,000 tons. In addition, high-grade ores are found in seven other states and iron ores of good appearance are known in every state in the country. The ores of Minas Geraes, São Paulo, Bahia, and Matto Grosso are predominately hematites, the others chiefly magnetites. The ores of Minas Geraes occur in one of the oldest and most densely populated interior regions of the country and on the road to the diamond mines of the northern part of the state, though about 500 kilometers from the coast. It is proposed to carry a railway line from the ore fields to the excellent port of Victoria and so improve the facilities for handling the ore that this port will become the center of the export industry. The iron ores occur in beds of quartzite and clay slates with subordinate beds of limestone, the whole series resting upon a complex of crystalline schists and gneisses intruded with granite. The massive portions of the iron-ore beds stand out as conspicuous topographic features, because of superior hardness, in the form of ridges heavily cloaked with ore rubble. Without coal deposits of comparable extent, Brazil can not hope to become a leader in the iron world unless other sources of power be developed or new sources discovered. The relative nearness of the deposits to the sea and the low rate of ocean transportation may offset this disadvantage however and make it possible for Brazil to supply the industrial countries of the northern hemisphere with cheap iron-ore when their deposits have become extensively depleted.

ISAIAH BOWMAN.

PROF. BREWSTER'S LECTURE. On Feb. 15, Professor James H. Brewster, of the University of Michigan, gave a lecture before the Society on certain phases of life in South America under the title "From Bahia to Buenos Aires." Mr. Brewster emphasized the remarkable diversity of conditions in the southern continent, gave a summary of the causes of this diversity, and showed that what is first needed for a correct understanding of our southern neighbors is to avoid forming too general a conception concerning them.

The superior illustrations, 100 in number, which accompanied the lecture, well exemplified this diversity. Views of São Salvador da Bahia, the old colonial capital of Brazil, were contrasted with a few scenes from the old Inca capital, Cuzco, in the same latitude. The characteristic features of Rio de Janeiro, Petropolis, and São Paulo were illustrated, as well as those of Montevideo, Buenos Aires and its neighbor, La Plata.

ASIA

THE STUDY OF TROPICAL FORESTS. Prof. J. Paul Goode writes to the *Bulletin* from Chicago that a private letter from Manila, announces the publication of Dr. H. N. Whitford's work on "The Composition and Volume of the Dipterocarp Forests of the Philippine Islands." It is issued by the Forestry Bureau of the Philippine Islands and represents several years of field work by its author. The magnitude and financial value of these forests are strikingly shown by a single quotation: "Our virgin forest area comprises 25,000,000 acres and has 200 billion board feet of timber standing on it. This is a good showing when compared with the 400 billion feet of timber on the 200,000,000 acres of the United States Forest Reserves."

Dr. Whitford is now at work on a larger and more complete monograph on "The Forests and Principal Forest Trees of the Philippines." The success of

the work done by our forestry service in the Philippines has won the admiration of all the governments interested in tropical forests. Dr. Treub, former director of the Botanical Gardens of Java, has sent a man to Manila to study the American forestry methods. An official of Portuguese East Africa has written asking Major Ahern, Director of Forestry, if he can send two experts to organize a similar survey for the African forests. Mayor Ahern in reply, gives some facts that will be of interest to Americans in general:

"The Bureau of Forestry has had the difficult task of investigating, protecting, and developing the enormous forest areas of the islands, without adequate men and funds for carrying on the work. In spite of these difficulties, however, most of the forests have been classified, estimated and mapped, and we now know what the forests of the Philippines contain, where and how the different forest types are situated, and the approximate cost of placing their lumber on the market.

"The forest wealth of the Philippines is found most largely, not in the high-priced cabinet woods, although their value is very large, but chiefly in the stands of cheaper structural timbers, such as may be used for most purposes in place of Oregon pine and Baltic fir and other similar timbers in Europe and America. This is distinctly advantageous, although it is contrary to the general idea of the composition of tropical forests. The value of the timber is further increased by the fact that the structural species often occur in almost pure stands and in large quantities, making their logging by modern steam methods comparatively simple and economical.

"I believe that the structural possibilities of tropical forests have been decidedly underrated, and that an investigation of other countries besides the Philippines will show large bodies of timber that can be lumbered cheaply and used for general construction purposes, for which there is always a large and steady demand."

Major Ahern adds: "Of all the men who, under my direction, have had charge of the forest work in the Philippines, chief credit is due to two foresters for what has been accomplished. These are Dr. H. N. Whitford, Chief of the Division of Investigation in this Bureau, and Mr. H. M. Curran, Forester in the same division."

These two men have an ambition to explore and take an inventory of tropical forests in general, the world around, and are hoping to obtain financial aid from the various countries interested, and possibly from private sources, and to organize extensively for the work.

Dr. Whitford is convinced that the "value of the tropical forests as a world asset is not appreciated, simply because our knowledge concerning their possibilities is so limited." He believes it is possible to open up to the world's commerce, immense wealth in tropical timber.

AUSTRALASIA

SURVEYS IN WESTERN AUSTRALIA. The Report of Surveyor General Johnston, for the year ending June 30, 1909, shows that the Department of Lands and Surveys is making diligent study of the economic resources of the State other than mineral wealth, which, in earlier years, has absorbed the largest share of attention. Several parties, in the past fiscal year, have been engaged in the

coastal country between Manjimup and Denmark, determining the extent of valuable forests and of lands with little marketable timber that are worth throwing open to settlement. It appears to be the policy to keep the best timbered lands out of the market in order to conserve the supply. Some of the survey parties report important areas that are suitable for cultivation and also great stretches of plains with sandy subsoil that, in places, are covered with a sufficient depth of mould to justify the belief that they may be turned into useful grass lands. The year's work resulted in a large number of maps and plans.

POLAR

PEARY'S SOUNDINGS FROM CAPE COLUMBIA TO THE POLE. On March 22 last, the Hon. J. Hampton Moore, of Pennsylvania, spoke in the House of Representatives, Washington, on Commander Peary's discovery of the North Pole. He gave considerable hitherto unpublished information, the most important relating to the soundings that were taken on the ice journey between Cape Columbia and the Pole. The following data are from Mr. Moore's speech which was printed in full at the government printing office. Here is the table of soundings:

SOUNDING BY	LATITUDE.	FATHOMS.	REMARKS.
Marvin.....	83° 7'	0	
Marvin.....	83° 10'	98	Edge of glacial fringe.
Marvin and McMillan.....	83° 25'	96	
Bartlett.....	83° 53'	110	Edge of continental shelf.
Marvin.....	84° 29'	825	
".....	84° 39'	580	
".....	84° 23'	310	
".....	85° 33'	700	No bottom.
Bartlett.....	87° 15'	1,260	" "
Peary.....	89° 55'	1,500	" "

In Commander Peary's notes he says that the sounding equipment consisted of two reels of specially made piano wire of 1,000 fathoms each, and three 20-pound leads with clam shell device for grasping samples of the bottom. One of the reels and leads was carried by Bartlett with his advance party and the main party carried the other reel and two leads. Portions of the main party's wire and the two leads were lost at various times, in hauling up, probably on account of kinks in the wire. When the main party sounding of 700 fathoms, no bottom, was made, this was all the wire they had left. When Bartlett ran out 1,260 fathoms, he stopped on account of a kink in the wire which he feared would part when the wire was hauled up. At this time, his 1,000 fathoms of wire and the remaining 500 fathoms of the other reel had been combined. Peary took this combined wire and made his sounding with it near the Pole, 1,500 fathoms, no bottom, and was hauling up when the wire parted again and he lost nearly all of it and the last lead. These facts explain the irregularity of the soundings that did not get bottom. Commander Peary adds these comments:

"The sounding of 310 fathoms at 85° 23' naturally impressed me at once as surprising and when Marvin reported the result to me, immediately after taking the sounding, I at once asked him if he was sure that he had the bottom, and he replied that he was, as the fact of this pronounced shoaling from 825 fathoms to 310 impressed him at once, and he made sure that his depth was correct.

"Again, when the sounding of 700 fathoms and no bottom was made about

10 miles further north, we both spoke of the peculiar fact of this outlying ridge with deeper channel intervening between it and the continental shelf, and Marvin again said that he was sure of his 310 fathoms reading.

"Had it not been for the loss of the last lead and practically all of the wire while making the soundings at the Pole, I should, on the return, have interpolated other soundings.

"The profile indicates that a line of 5-mile interval soundings from Cape Columbia to the eighty-sixth parallel might develop a particularly interesting profile of the bottom of the Arctic Ocean."

Mr. R. A. Harris, the tidal expert of the Coast and Geodetic Survey, reported on Peary's tidal records which consisted of practically unbroken series of hourly readings of the height of the tide, taken night and day, at Cape Sheridan for 231 days, Cape Columbia, 29 days, Cape Bryant, 28 days, and Fort Conger, 10 days. Mr. Harris says that, in order to show the full geographical value of the results, they must be considered in connection with all other Arctic tidal results. This work is now in progress. Peary's tidal observations leave little to be desired between Cape Morris Jesup and Cape Columbia; but there are long stretches of the Arctic coast where nothing is available. This is especially true of the Russian coast and the western and northern portions of the Arctic archipelago. Peary's results show that the tides along the northern coasts of Grantland and Greenland differ in many respects from what had been supposed. For example, his records prove that the tide occurs three hours earlier at Cape Columbia than at Cape Sheridan, and not later, as had been assumed.

PHYSICAL GEOGRAPHY

LANDSLIDES. In a recent study of landslides (*Landslides in the San Juan Mountains, Colorado*, by Ernest Howe, *Prof. Paper 67*, U. S. Geol. Surv., 1909, pp. 1-55), Mr. Howe describes the Cimarron landslide of 1886 and two other recent landslides. The older groups of landslides of the Telluride, Rico, Silverton, and three other districts are presented, together with one slip which seems to be interglacial. The classification and explanations of landslides by Heim and by Penck are summarized. The landslides of the San Juan Mountains are then discussed in relation to shattering, jointing, relation of weak and resistant layers and other physical conditions which vary considerably in the sedimentary and the volcanic rocks of the landslide areas. These factors have had a stronger influence on landslides than structural conditions. Topographic conditions, especially the oversteepening of valley walls through glacial erosion, have had an important relation to the landslides, as have certain external causes, such as earthquakes, readjustment of internal stresses in the mountains, and saturation of the rocks by meteoric waters. A classification of the hundred or more San Juan landslides is presented.

A specialized type of landslides, the rock streams, are discussed by Howe, Patton, and Capps. The first descriptions are in the above publication (pp. 31-41, 49-55), where Mr. Howe describes a number of these forms. They seem to be intermediate between ordinary talus and landslides and look like small glaciers completely covered with ablation moraine. One of these streams is three-fourths of a mile long, one-fourth of a mile wide and 50 to 100 feet deep. An adjacent mud flow is over six miles long. The streams are illustrated by

excellent photographs and maps. They are classified as due to rock falls, in contrast to rock slides which result in landslides. In the case of the rock streams it is conceived that the rocks are shattered, and if the mass is of sufficient magnitude, the shattered rock may move outward from the base of the cliffs with great velocity as a flow of newly-made detritus.

Prof. H. B. Patton describes a second group of rock streams, also from Colorado (Winter meeting, Geol. Society of America, Dec., 1909). They are on the west side of Veta Mountain, east of the Sangre de Christo Range.

The third series of rock streams are in Alaska (Rock Glaciers in Alaska, by Stephen R. Capps, Geol. Soc. of Washington, *Science*, N. S., Vol. XXX, 1909, page 974). Mr. Capps describes a series of rock streams, also shown finely on the Nizina Special map of the U. S. Geological Survey. They are from one-half mile to two and one-half miles long, from one-tenth to three-fifths of a mile wide and have slopes varying from 9° to 18° . "In slopes, shape, and surface markings they bear a striking resemblance to glaciers. In the upper portions, longitudinal ridges and furrows are conspicuous, while toward the lower ends the ridges become concentric, parallel with the borders of the lower ends of the flows. A few of the rock glaciers actually grade into true glaciers at their upper ends." All these rock glaciers are said by Mr. Capps to be cemented with interstitial ice which has imparted their motion to them. Why they are not dying glaciers is not stated.

These Alaskan rock streams or rock glaciers head in cirques which no longer have perennial snows, although adjacent higher cirques produce many glaciers in the same region. This raises the question whether the Colorado rock streams, described by Messrs. Howe and Patton, some of which, at least, head in cirques and which except for the observed interstitial ice seem exactly like the Alaskan masses, may not have been formed in association with the former glaciers of Colorado.

LAWRENCE MARTIN.

A NATIONAL BUREAU OF SEISMOLOGY. The following resolution was passed by the Seismological Society of America at a meeting held in San Francisco, on March 2:

"*Resolved*, that the Seismological Society of America strongly favors the establishment of a National Bureau of Seismology with power: (a) To collect seismological data; (b) to establish observing stations; (c) to study and investigate special earthquake regions within the national domain; (d) to co-operate with other scientific bodies and organizations and individual scientists in forwarding the development and dissemination of seismological knowledge.

"It also favors the organization of this bureau under the Smithsonian Institution with the active co-operation of other scientific departments of the government."

Copies of the resolution were sent to the President, President of the Senate, the Speaker of the House of Representatives, Secretary of the Smithsonian Institution and the members of the House Committee on Library which has this matter under consideration.